Claims

What is claimed is:

1. A wireless communication system supporting orthogonal frequency division multiplexing (OFDM) having a base station comprising:
    a) a quadrature modulator adapted to generate symbols from data to be transmitted;
    b) a symbol encoder adapted to encode the symbols based on space and time wherein constellation position and timing of the symbols are affected to provide a plurality of series of encoded symbols;
    c) transform circuitry adapted to provide a type of inverse Fourier Transform (IFT) on each of the plurality of series of encoded symbols to provide a series of IFT symbols; and
    d) a plurality of transmission paths, each of which being coupled to one of a plurality of antennas and adapted to modulate one of the series of IFT symbols for transmission from one of the plurality of antennas to provide spatial diversity.

2. The wireless communication system of claim 1 wherein the base station further comprises cyclic extension circuitry in each of the plurality of transmission paths and adapted to receive and add cyclic extensions to the IFT symbols prior to modulation and transmission.

3. The wireless communication system of claim 1 wherein the base station further comprises data encoding circuitry adapted to receive and process the data to be transmitted prior to modulation by the quadrature modulator to facilitate error correction or detection by a receiver of the transmitted data.

4. The wireless communication system of claim 1 further comprising at least one additional base station configured like the base station

wherein the frequency reuse factor with respect to the base station and the at least one additional base station is approximately one (1).

5. The wireless communication system of claim 4 wherein the base station and the at least one additional base station are synchronized to a common clock signal.

6. The wireless communication system of claim 1 further comprising receiver circuitry for receiving signals modulated using a technique other than OFDM.

7. A wireless communication method supporting orthogonal frequency division multiplexing (OFDM) comprising:
   a) quadrature modulating data to be transmitted into symbols;
   b) encoding the symbols based on space and time wherein constellation position and timing of the symbols are affected to provide a plurality of series of encoded symbols;
   c) providing a type of inverse Fourier Transform (IFT) on each of the plurality of series of encoded symbols to provide a series of IFT symbols;
   d) modulating each of the series of IFT symbols to provide a plurality of modulated signals; and
   e) transmitting each of the plurality of modulated signals from one of a respective plurality of antennas to provide spatial diversity.

8. The wireless communication method of claim 7 further comprising adding cyclic extensions to the IFT symbols prior to modulation and transmission.

9. The wireless communication method of claim 7 further comprising receiving and processing the data to be transmitted prior to modulation by the quadrature modulator to facilitate error correction or detection by a receiver of the transmitted data.

10. The wireless communication method of claim 7 further comprising providing the above communication steps from a plurality of base stations wherein the frequency reuse factor with respect to the plurality of base stations is approximately one (1).

11. The wireless communication method of claim 10 wherein each of the plurality of base stations are synchronized to a common clock signal.

12. The wireless communication method of claim 7 further comprising receiving signals modulated using a technique other than OFDM.

13. A wireless communication system supporting orthogonal frequency division multiplexing (OFDM) comprising:
   a) means for quadrature modulating data to be transmitted into symbols;
   b) means for encoding the symbols based on space and time wherein constellation position and timing of the symbols are affected to provide a plurality of series of encoded symbols;
   c) means for providing a type of inverse Fourier Transform (IFT) on each of the plurality of series of encoded symbols to provide a series of IFT symbols;
   d) means for modulating each of the series of IFT symbols to provide a plurality of modulated signals; and
   e) means for transmitting each of the modulated signals from one of a respective plurality of antennas to provide spatial diversity.

14. The wireless communication system of claim 13 further comprising means for adding cyclic extensions to the IFT symbols prior to modulation and transmission.

15. The wireless communication system of claim 13 further comprising means for receiving and processing the data to be transmitted prior to modulation by the quadrature modulator to facilitate error correction or detection by a receiver of the transmitted data.

16. The wireless communication system of claim 13 further comprising means for receiving signals modulated using a technique other than OFDM.

17. A wireless communication system supporting orthogonal frequency division multiplexing (OFDM) comprising:
   a) a plurality of antennas to provide spatial diversity;
   b) a plurality of receiving paths, each of which being coupled to one of the plurality of antennas and adapted to demodulate received signals to provide a plurality of series of inverse Fourier Transform (IFT) symbols;
   c) transform circuitry adapted to receive each of the plurality of series of IFT symbols from each of the plurality of receiving paths and provide a type of Fourier Transform (FT) on each of the plurality of series of IFT symbols to provide a plurality of series of encoded symbols mixed with interfering signals;
   d) interference cancellation circuitry adapted to estimate each of the plurality of series of encoded symbols and cancel the interfering signals to provide each of the plurality of series of encoded symbols;
   e) a symbol decoder adapted to decode each of the plurality of series of encoded symbols based on space and time wherein constellation position and timing of the symbols are affected during encoding to provide a series of symbols; and
   f) a quadrature demodulator adapted to demodulate the series of symbols into data corresponding to that originally transmitted.

18. The wireless communication system of claim 17 further comprising cyclic extension circuitry in each of the plurality of receiving paths and adapted to receive and remove cyclic extensions from the plurality of series of IFT symbols prior to providing the type of Fourier Transform.

19. The wireless communication system of claim 17 further comprising data decoding circuitry adapted to receive and process the data to provide error correction or detection.

20. The wireless communication system of claim 17 further comprising transmitter circuitry for transmitting signals modulated using a technique other than OFDM.

21. A wireless communication method supporting orthogonal frequency division multiplexing (OFDM) comprising:

   a) receiving signals from a plurality of antennas at a plurality of receiving paths;
   b) demodulating the signals in each of the plurality of receiving paths to provide a plurality of series of inverse Fourier Transform (IFT) symbols;
   c) providing a type of Fourier Transform (FT) on each of the plurality of series of IFT symbols to provide a plurality of series of encoded symbols mixed with interfering signals;
   d) estimating each of the plurality of series of encoded symbols and canceling the interfering signals to provide each of the plurality of series of encoded symbols;
   e) decoding each of the plurality of series of encoded symbols based on space and time wherein constellation position and timing of the symbols are affected during encoding to provide a series of symbols; and
   f) demodulating the series of symbols into data corresponding to that originally transmitted.

22. The wireless communication method of claim 21 further comprising receiving and removing cyclic extensions from the plurality of series of IFT symbols prior to providing the type of Fourier Transform.

23. The wireless communication method of claim 21 further comprising receiving and processing the data to provide error correction or detection.

24. The wireless communication method of claim 21 further comprising transmitting signals modulated using a technique other than OFDM.

25. A wireless communication system supporting orthogonal frequency division multiplexing (OFDM) comprising:
    a) means for receiving signals from a plurality of antennas at a plurality of receiving paths;
    b) means for demodulating the signals in each of the plurality of receiving paths to provide a plurality of series of inverse Fourier Transform (IFT) symbols;
    c) means for providing a type of Fourier Transform (FT) on each of the plurality of series of IFT symbols to provide a plurality of series of encoded symbols mixed with interfering signals;
    d) means for estimating each of the series of encoded symbols and canceling the interfering signals to provide each of the series of encoded symbols;
    e) means for decoding each of the plurality of series of encoded symbols based on space and time wherein constellation position and timing of the symbols are affected during encoding to provide a plurality of series of symbols; and
    f) means for demodulating the series of symbols into data corresponding to that originally transmitted.

26. The wireless communication system of claim 25 further comprising means for receiving and removing cyclic extensions from the plurality of series of IFT symbols prior to providing the type of Fourier Transform.

27. The wireless communication system of claim 25 further comprising means for receiving and processing the data to provide error correction or detection.

28. The wireless communication system of claim 21 further comprising means for transmitting signals modulated using a technique other than OFDM.